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TECHNICAL MEMORANDUM

(TM Series)

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160-A Utility Program Descriptions

Milestone XI

SENPAP

Prepared by

E. J. Rosenberg

18 January 1963

Approved by

J. B. Munson

SYSTEM DEVELOPMENT CORPORATION

2500 COLORADO AVE.

SANTA MONICA

CALIFORNIA

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SUBROUTINE IDENTIFICATION

A. Title: General Paper Tape Input-Output (SENPAP) 18C AA

B. Programmer: E. J. Rosenberg, System Development Corporation, 17 January 1963

PURPOSE

SENPAP is a 160-A program which provides an off-line capability of generating magnetic tape from paper tape for input to 1604 programs, and generating paper tape output from magnetic tape produced by 1604 programs.

The function of this program is to relieve the 1604 of time consuming paper tape reading and punching.

USAGE

A. Operating Procedures

1. Set selective jump keys as desired (see USAGE, Paragraph 7).
2. Make tape 2 ready.
3. Ready the paper tape punch or card reader.
4. Call SENPAP from the OSCON master.

B. Parameters

1. Card: (All fields left justified)

Col	Options	Meaning
1	5, 7, or 8	PT level is 5, 7, or 8
1-3	END	Write double EOF on tape drive 2 or punch 50 blank trailer frames and return to OSCON.
2-6	A	All of file is to be processed.

	CXXXX*$_{10}$	Count through XXXX$_{10}$ 1604 words before processing.
	SYYZZ*	Search input through characters YYZZ before processing.
7-11	CXXXX*$_{10}$	Process XXXX$_{10}$ 1604 words.
12	A	Input-output will be assembly mode (i.e. 8 characters per 1604 words)
	C	Input-output will be character mode (i.e. 1 character per 1604 words)
13	H	With the magnetic tape to paper tape option print the visual header on the 1612.
	Blank	No visual header or the paper to magnetic tape option was elected
14-17	SSSS*$_{10}$	Skip XXXX$_{10}$ files on the magnetic tape before processing.

---

* XXXX$_{10}$	Decimal equivalent of number of 1604 words. It cannot exceed 1024, except for paper tape input to be written in assembly mode where 2046 is the maximum.
SSSS$_{10}$	Any decimal number less than 2047.
YY	First of two coded characters to be searched on.
ZZ	Second of two coded characters to be searched on.

18	L	Loop continuously on other parameters until: 1. Twenty blank frames were found on paper tape input. 2. Double EOF was sensed on magnetic tape input.
	Blank	No Loop

2. Typewriter

   a. Same as above except:

      (1) Spaces or 0 will be treated as 0.

      (2) A carriage return will nulify all preceeding input and start receiving parameters again.

      (3) No spaces are required between the "ALL" option and next parameter.

3. Messages

   a. "PARAMETERS" - Request for parameters, if typewriter control is elected. Type in parameters in control card format. (See Paragraph USAGE, B.1.)

   b. "ILLEGAL PARAMETERS" - Self explanatory. To input correct parameters, run from this stop. Program will return to input new parameters.

   c. "NOT ENOUGH PARAMETERS" - Self explanatory. Correction procedure same as Paragraph 3.b., above.

   d. "CORE IS FULL - RUN TO WRITE THIS RECORD" - Input has reached maximum storage allowed.

   e. "TAPE LEVEL MUST BE 5, 7, or 8" - Self explanatory. Correction procedure same as Paragraph 3.b., above.

   f. "MAXIMUM COUNT IS 1023 1604 WORDS" - Parameters request more words than can be accommodated. Correction procedure same as Paragraph 3.b., above.

4. Error Returns

   See Messages

5. Tape Assignments

Tape drive logical unit 1. - OSCON MASTER

Tape drive logical unit 2. - I/O Tape

6. Input-Output Formats

a. 12 bit (binary) magnetic tape input-output.

b. 5, 7, or 8 level paper tape.

7. Jump Keys:

Jump key 2 is set for typewriter control and not set for card reader (088) control.

Jump key 4 is set for paper to magnetic tape and not set for magnetic to paper tape.

8. Results

Either paper tape will be punched in the format prescribed by input parameters or a magnetic tape will be written.

RESTRICTIONS:

A. Minimum hardware

The program can be run with: 8K 160-A,
161 Typewriter
163-2 Magnetic Tape Unit

1. To process paper tape to magnetic tape in records exceeding 511 1604 words, a 169 is required.

2. An 088 card reader is optional.

B. Limits on Volume

Input is restricted to:

Paper tape to magnetic tape assembly mode, 2046_{10} 1604 words
Paper tape to magnetic tape character mode, 1024_{10} 1604 words
Magnetic tape to paper tape assembly mode, 1024_{10} 1604 words
Magnetic tape to paper tape character mode, 1024_{10} 1604 words

TIMING:

Timing is predicated on the speed of the I/O devices employed. No buffering is employed.

STORAGE REQUIREMENTS:

2342_8 cells of Bank 0 for the program.

72_8 cells of Bank 0 for storage and constants

1155_8 cells of Bank 0 for storage

All of Banks 1 & 2 for input/output

VALIDATION TESTS:

A. A five level paper tape of indefinite length was input with the following parameters on cards: selective jump 4 was set.

1. 5A A 0001
meaning: Five level tape; all; assembly mode; skip 1 file.

2. 5C0050C0001A 0000L
meaning: Five level; count beyond 50 words; process 1 word; assembly mode; skip 0 files; loop on these parameters.

3. 5C0001S4545A 0000
meaning: Five level; count beyond one word; process until consecutive codes 45-45 are encountered and processed; assembly mode; skip 0 files on magnetic tape.

4. 5S0101S4545A 0002
meaning: Five level; search until consecutive codes 01-01 are skipped; process until codes 45-45 are processed; assembly mode.

5. 5S0101C2040A 0000L
meaning: Five level; search until consecutive codes 01-01 are skipped; process 2040_{10} 1604 words; assembly mode; skip 0 files; loop on these parameters.

6. Input above specifications changing everything to character mode.

7. Input above specifications via typewriter.

8. Run above tests with jump key 4 not set. This is for magnetic tape to paper tape.

B. Outputs were those portions of the test tape as described by parameters.

C. Visual header listing was not tested.

REFERENCES:

A. SENPAP program deck is under AFCPL catalogue number 80018.

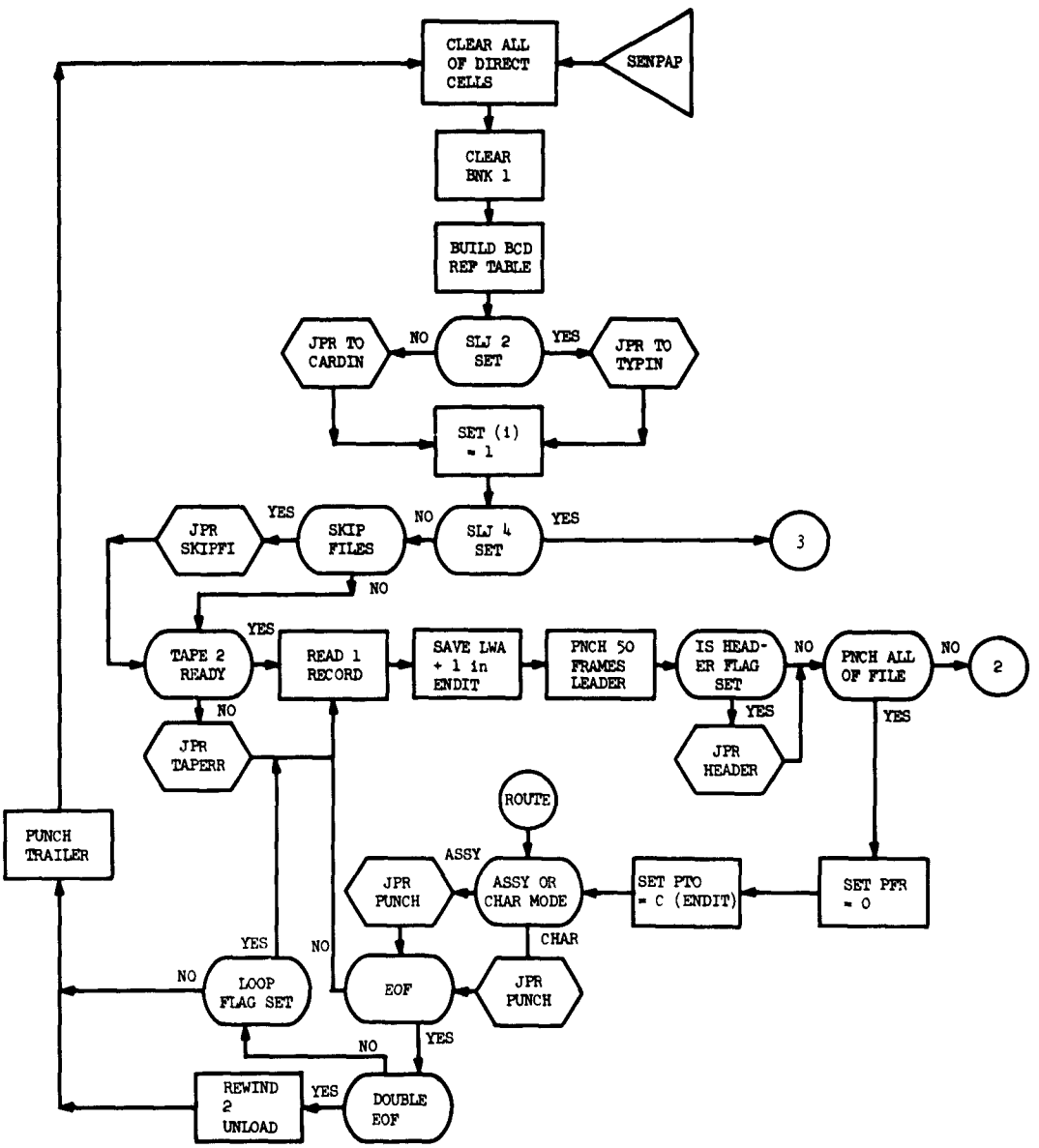
B. SENPAP test materials are under AFCPL catalogue number 80018.

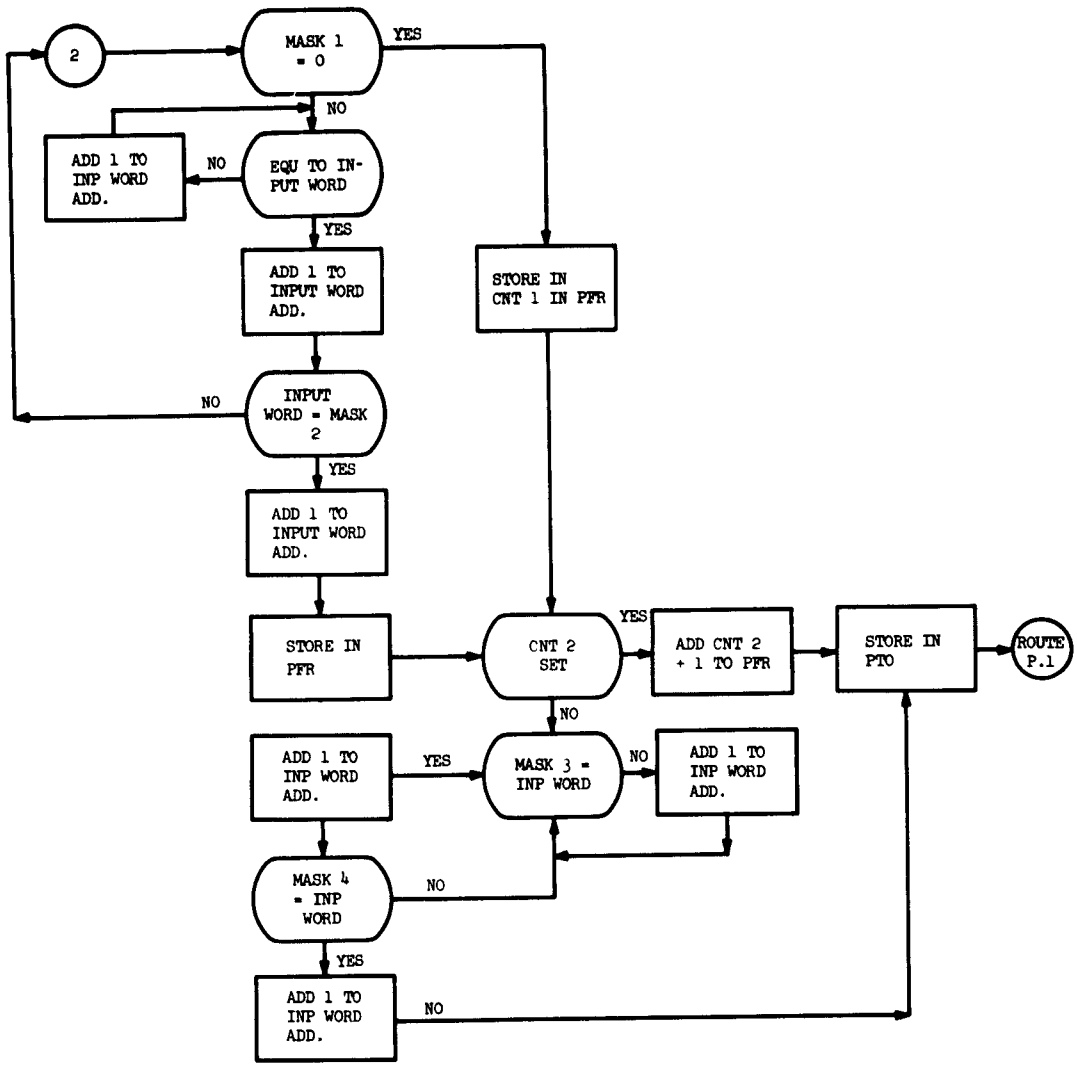
FLOW DIAGRAM

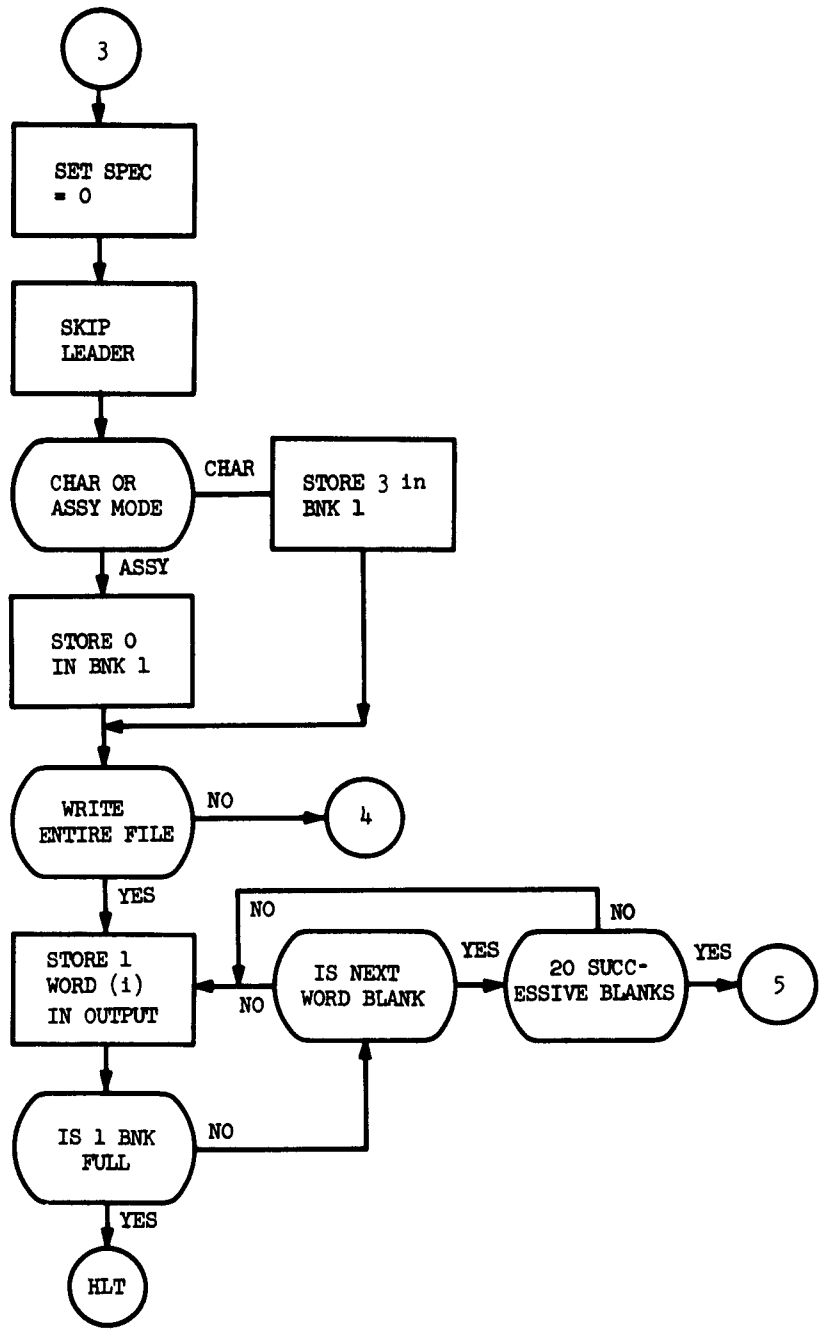
See Appendix A.

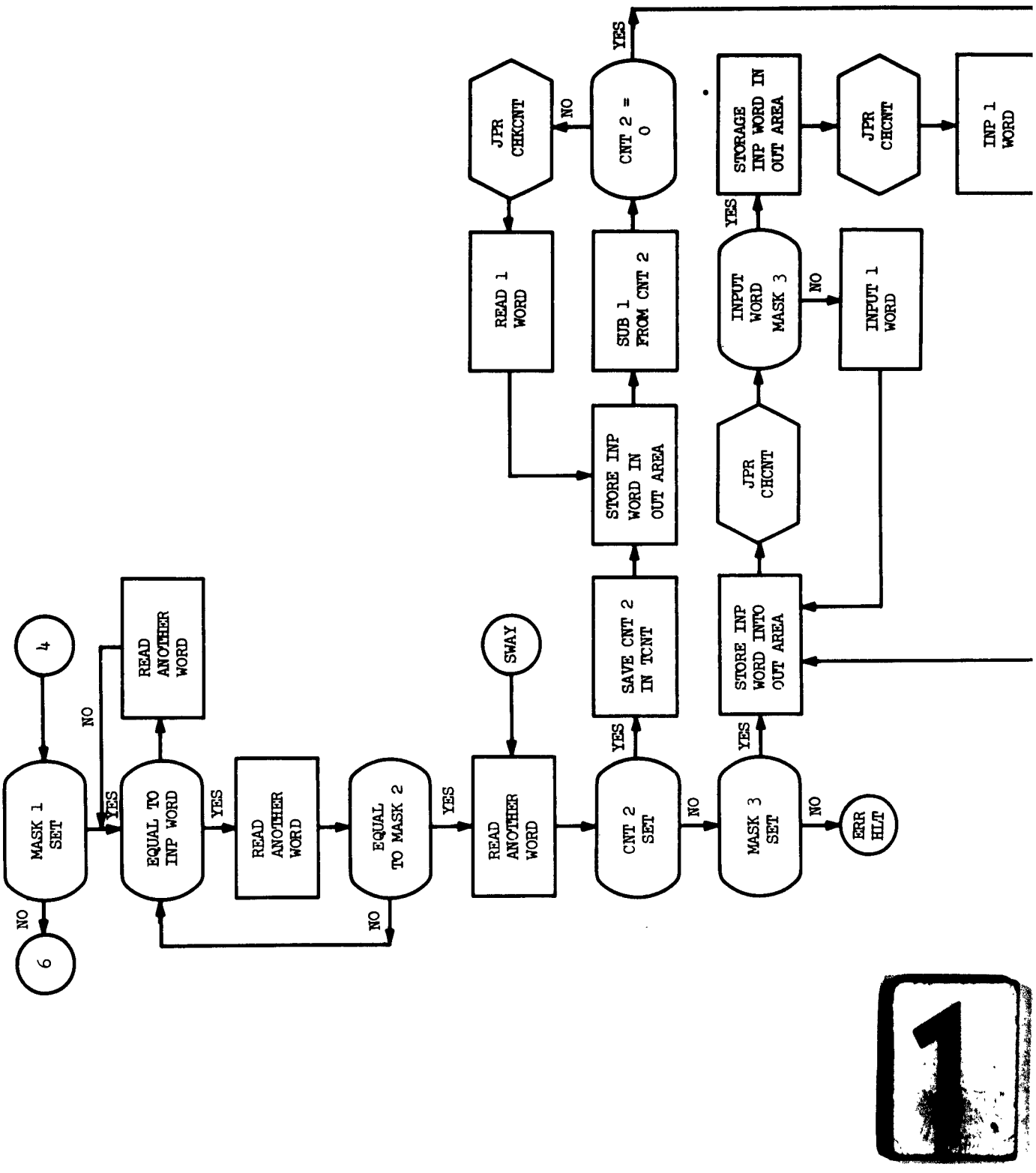
APPENDIX A

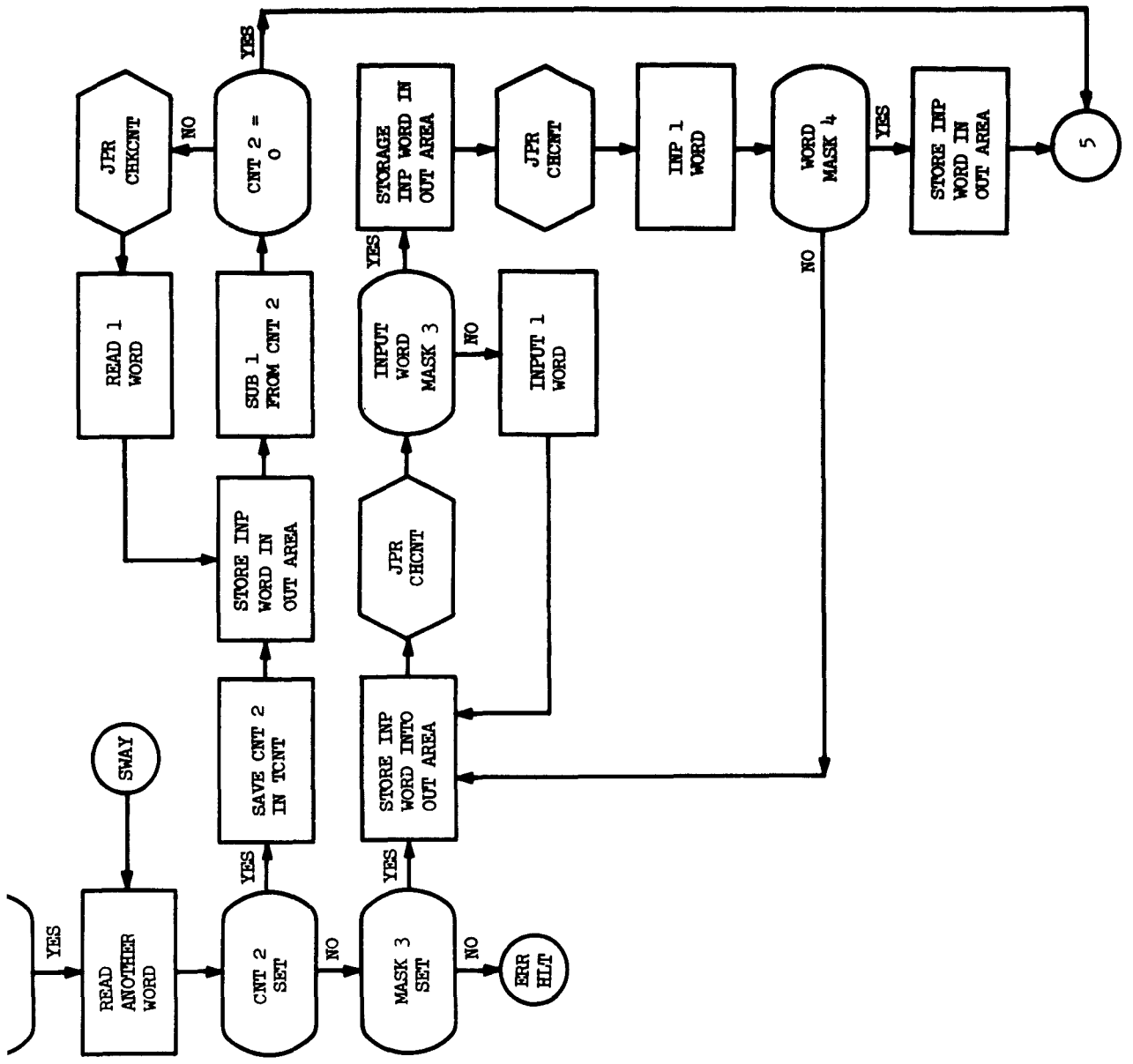
SENPAP FLOW DIAGRAMS


CLEAR ALL OF DIRECT CELLS
SENPAP
CLEAR BNK 1
BUILD BCD REF TABLE
JPR TO CARDIN
NO
SLJ 2 SET
YES
JPR TO TYPIN
SET (1) = 1
JPR SKIPFI
YES
SKIP FILES
NO
SLJ 4 SET
YES
3
NO
TAPE 2 READY
YES
READ 1 RECORD
SAVE LWA + 1 in ENDIT
PNCH 50 FRAMES LEADER
IS HEADER FLAG SET
NO
PNCH ALL OF FILE
NO
2
NO
JPR TAPERR
YES
JPR HEADER
YES
ROUTE
PUNCH TRAILER
ASSY
JPR PUNCH
ASSY OR CHAR MODE
SET PTO = C (ENDIT)
SET PFR = 0
CHAR
YES
NO
NO
LOOP FLAG SET
EOF
JPR PUNCH
NO
YES
REWIND 2 UNLOAD
YES
DOUBLE EOF

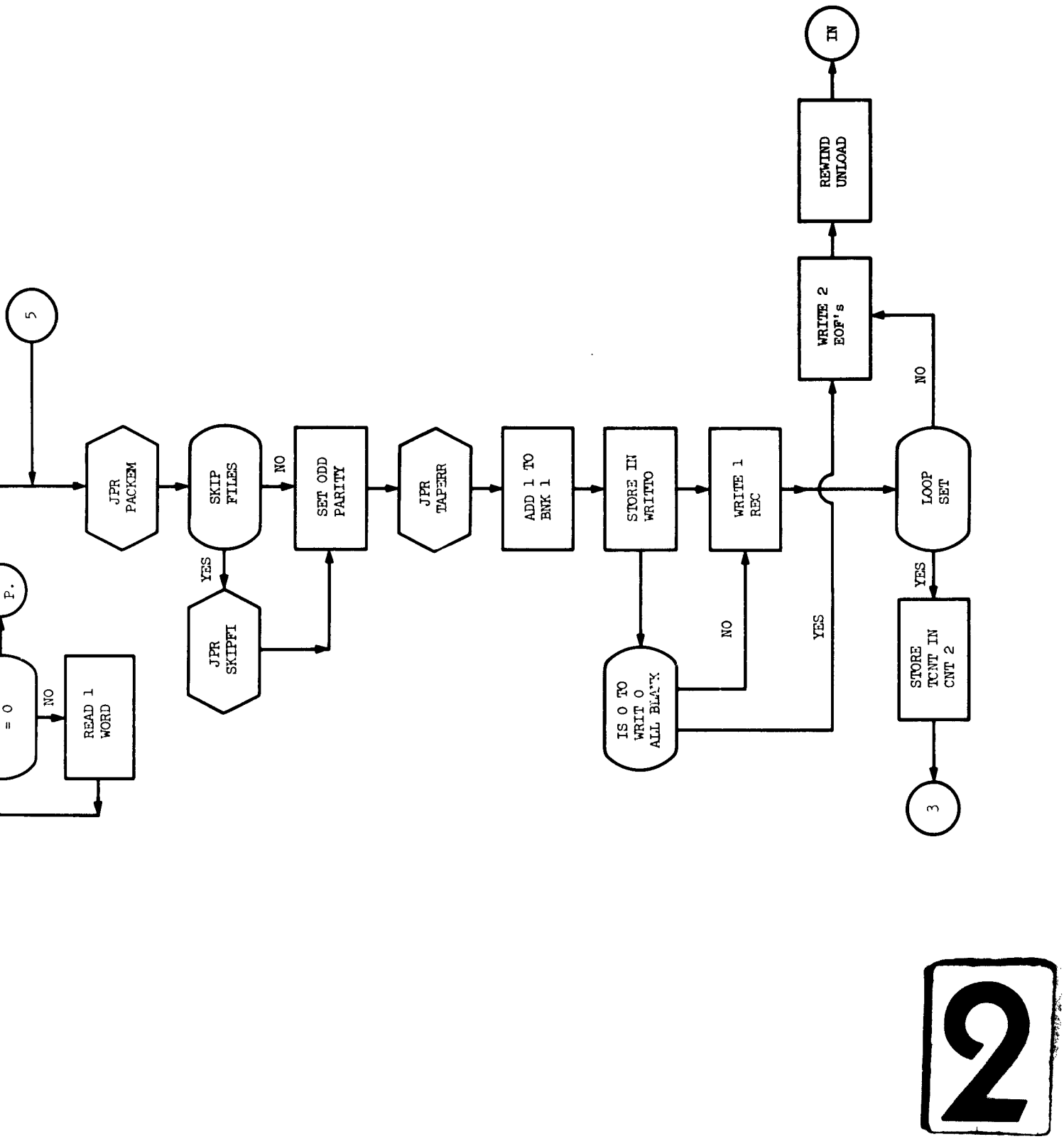

2
MASK 1 = 0
YES
NO
ADD 1 TO INP WORD ADD.
NO
EQU TO INPUT WORD
YES
ADD 1 TO INPUT WORD ADD.
STORE IN CNT 1 IN PFR
INPUT WORD = MASK 2
NO
YES
ADD 1 TO INPUT WORD ADD.
STORE IN PFR
CNT 2 SET
YES
ADD CNT 2 + 1 TO PFR
STORE IN PTO
ROUTE P.1
NO
ADD 1 TO INP WORD ADD.
YES
MASK 3 = INP WORD
NO
ADD 1 TO INP WORD ADD.
MASK 4 = INP WORD
NO
YES
ADD 1 TO INP WORD ADD.
NO

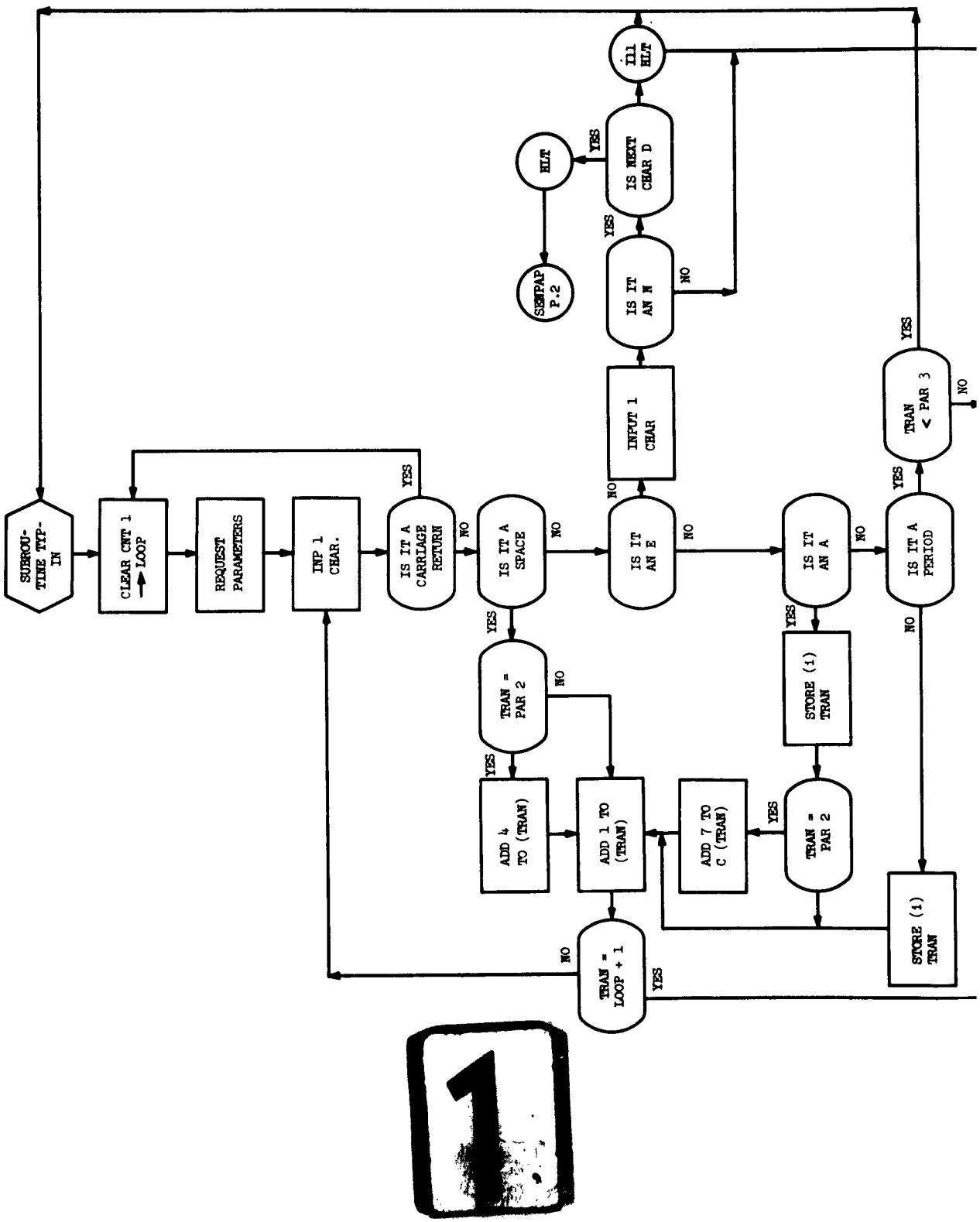

3
SET SPEC = 0
SKIP LEADER
CHAR OR ASSY MODE
CHAR
STORE 3 in BNK 1
ASSY
STORE 0 IN BNK 1
WRITE ENTIRE FILE
NO
4
YES
STORE 1 WORD (i) IN OUTPUT
NO
NO
IS NEXT WORD BLANK
YES
NO
20 SUCC-ESSIVE BLANKS
YES
5
IS 1 BNK FULL
NO
YES
HLT


4
MASK 1 SET
NO
6
YES
EQUAL TO INP WORD
NO
READ ANOTHER WORD
YES
READ ANOTHER WORD
EQUAL TO MASK 2
NO
YES
SWAY
READ ANOTHER WORD
CNT 2 SET
YES
SAVE CNT 2 IN TCNT
NO
MASK 3 SET
YES
STORE INP WORD INTO OUT AREA
NO
ERR HLT
JPR CHKCNT
NO
READ 1 WORD
STORE INP WORD IN OUT AREA
CNT 2 = 0
YES
SUB 1 FROM CNT 2
JPR CHCNT
YES
INPUT WORD MASK 3
NO
INPUT 1 WORD
STORAGE INP WORD IN OUT AREA
JPR CHCNT
INP 1 WORD

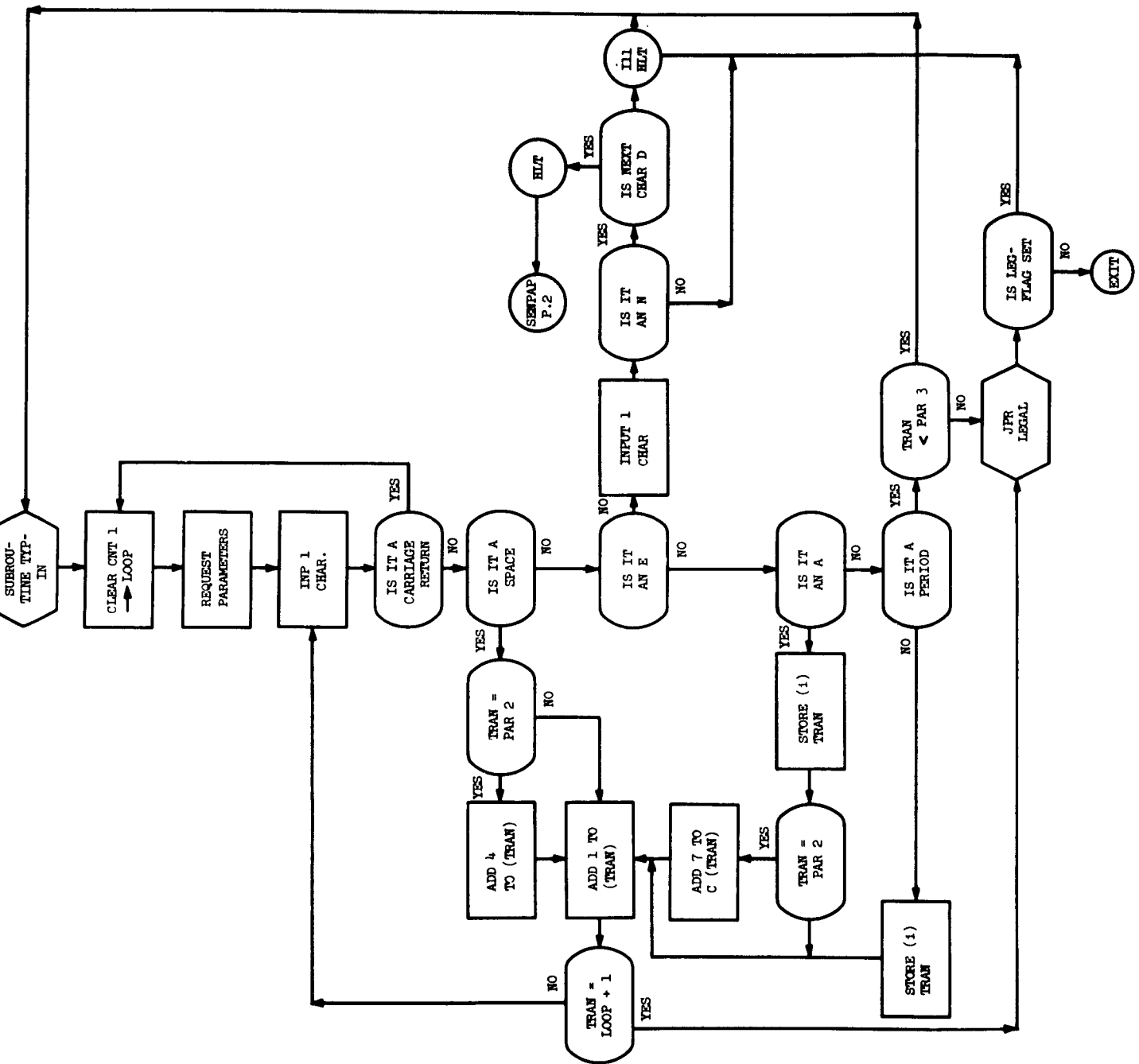

YES
READ ANOTHER WORD
SWAY
CNT 2 SET
NO
YES
SAVE CNT 2 IN TCNT
STORE INP WORD IN OUT AREA
SUB 1 FROM CNT 2
READ 1 WORD
JPR CHKCNT
NO
CNT 2 = 0
YES
MASK 3 SET
NO
ERR HLT
YES
STORE INP WORD INTO OUT AREA
JPR CHCNT
INPUT WORD MASK 3
NO
INPUT 1 WORD
YES
STORAGE INP WORD IN OUT AREA
JPR CHCNT
INP 1 WORD
WORD MASK 4
YES
NO
STORE INP WORD IN OUT AREA
5

5
JPR PACKBM
SKIP FILES
NO
SET ODD PARITY
JPR TAPESR
ADD 1 TO BMK 1
YES
JPR SKIPFI
SWAY P.
YES
CNT 1 = 0
NO
READ 1 WORD
NO
CNT 1 SET
YES
SUB 1 FROM CNT 1
6
SAVE CNT 1

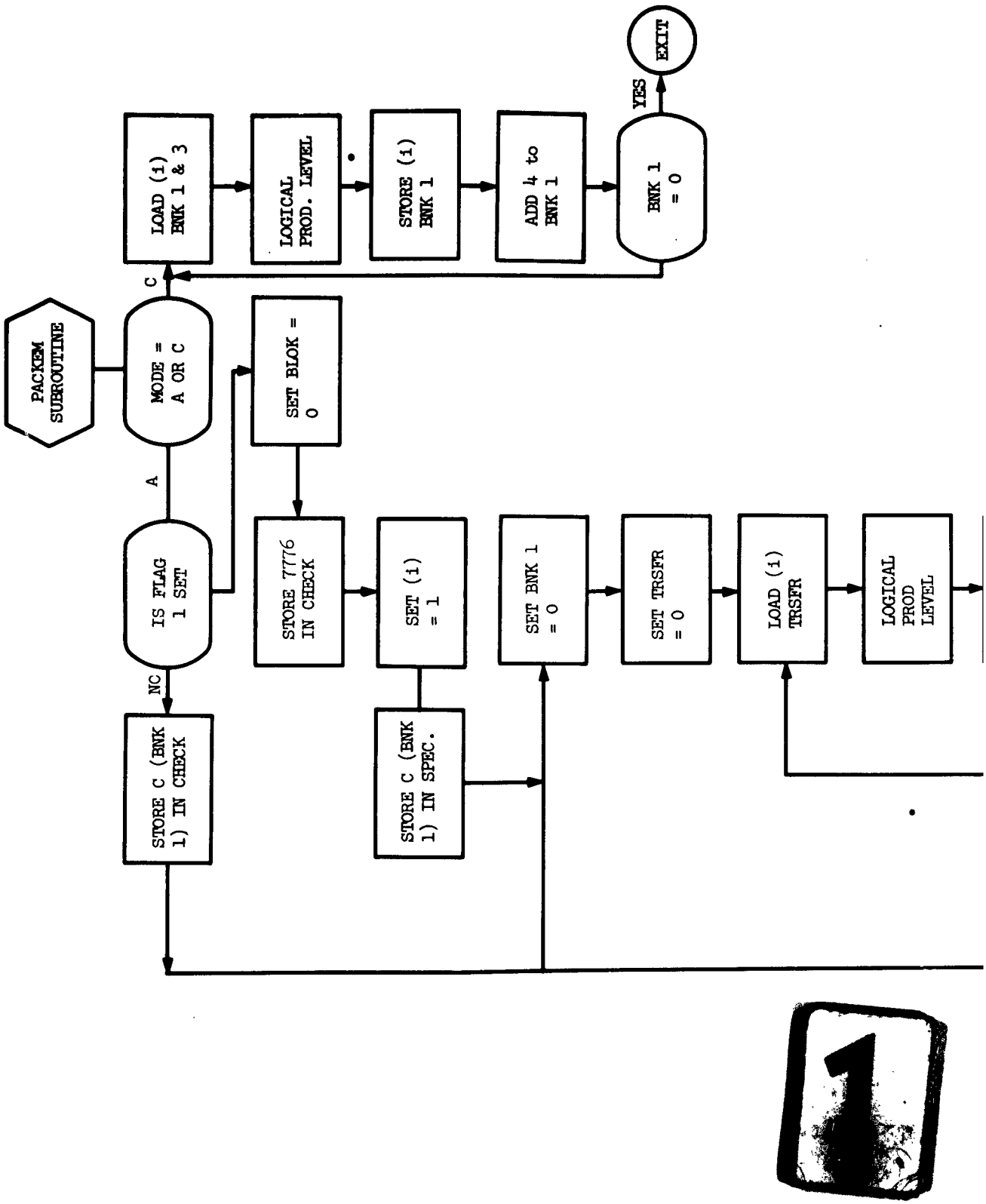

5
P.
= 0
NO
READ 1 WORD
JPR PACKEM
SKIP FILES
YES
JPR SKIPFI
NO
SET ODD PARITY
JPR TAPERR
ADD 1 TO BNK 1
STORE IN WRITTO
IS 0 TO WRIT 0 ALL BLANK
NO
WRITE 1 REC
YES
LOOP SET
YES
STORE TCNT IN CNT 2
3
NO
WRITE 2 EOF's
REWIND UNLOAD
IN

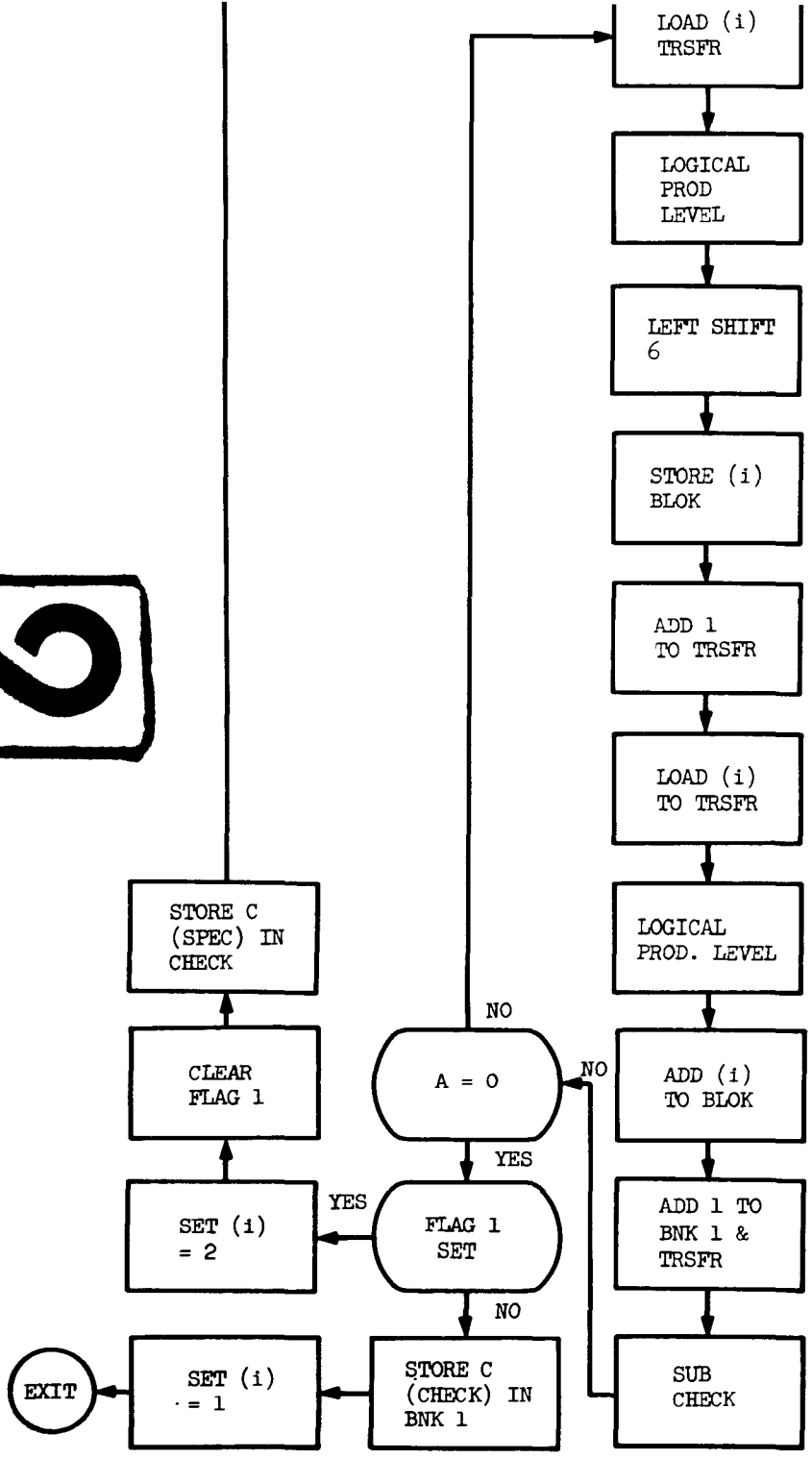

SUBROU-
TINE TYP-
IN
CLEAR CNT 1
LOOP
REQUEST
PARAMETERS
INP 1
CHAR.
IS IT A
CARRIAGE
RETURN
YES
NO
IS IT A
SPACE
NO
YES
IS IT
AN E
NO
INPUT 1
CHAR
NO
IS IT
AN M
YES
HLT
YES
SEMPAP
P.2
IS NEXT
CHAR D
YES
HLT
NO
IS IT
AN A
NO
YES
STORE (1)
TRAN
IS IT A
PERIOD
YES
TRAN
< PAR 3
YES
NO
NO
TRAN =
PAR 2
YES
NO
ADD 4
TO (TRAN)
ADD 1 TO
(TRAN)
ADD 7 TO
C (TRAN)
YES
TRAN =
PAR 2
STORE (1)
TRAN
TRAN =
LOOP + 1
NO
YES

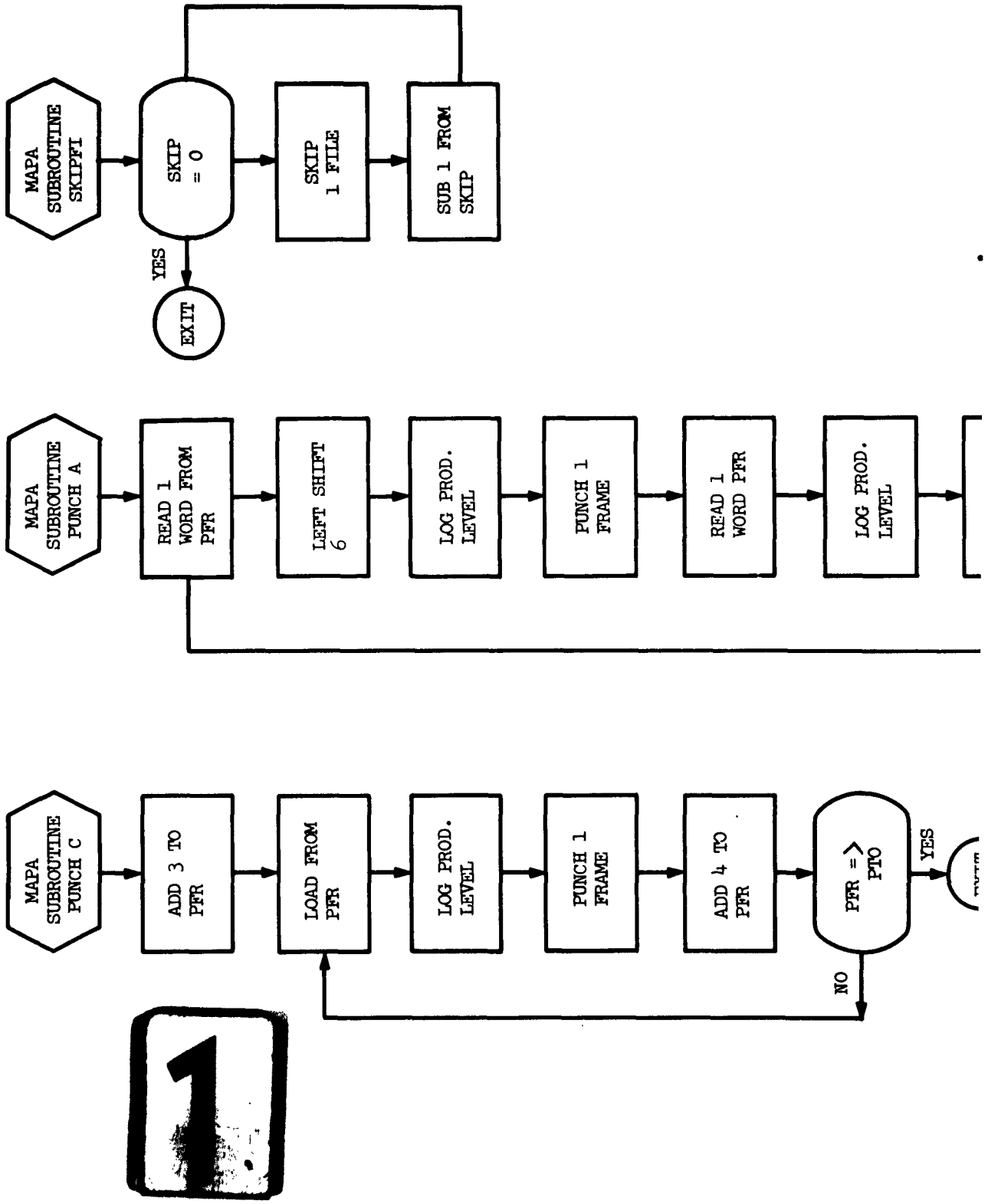
1


SUBROU-
TINE TYP-
IN
CLEAR CNT 1
LOOP
REQUEST
PARAMETERS
INP 1
CHAR.
IS IT A
CARRIAGE
RETURN
YES
NO
IS IT A
SPACE
YES
NO
TRAN =
PAR 2
YES
NO
ADD 4
TO (TRAN)
ADD 1 TO
(TRAN)
TRAN =
LOOP + 1
NO
YES
IS IT
AN E
NO
YES
INPUT 1
CHAR
IS IT
AN N
YES
NO
IS NEXT
CHAR D
YES
HLT
SEMPAP
P.2
ILL
HLT
IS IT
AN A
YES
NO
STORE (1)
TRAN
ADD 7 TO
C (TRAN)
TRAN =
PAR 2
YES
STORE (1)
TRAN
IS IT A
PERIOD
YES
NO
TRAN
< PAR 3
YES
NO
JPR
LEGAL
IS LEG-
FLAG SET
YES
NO
EXIT

2

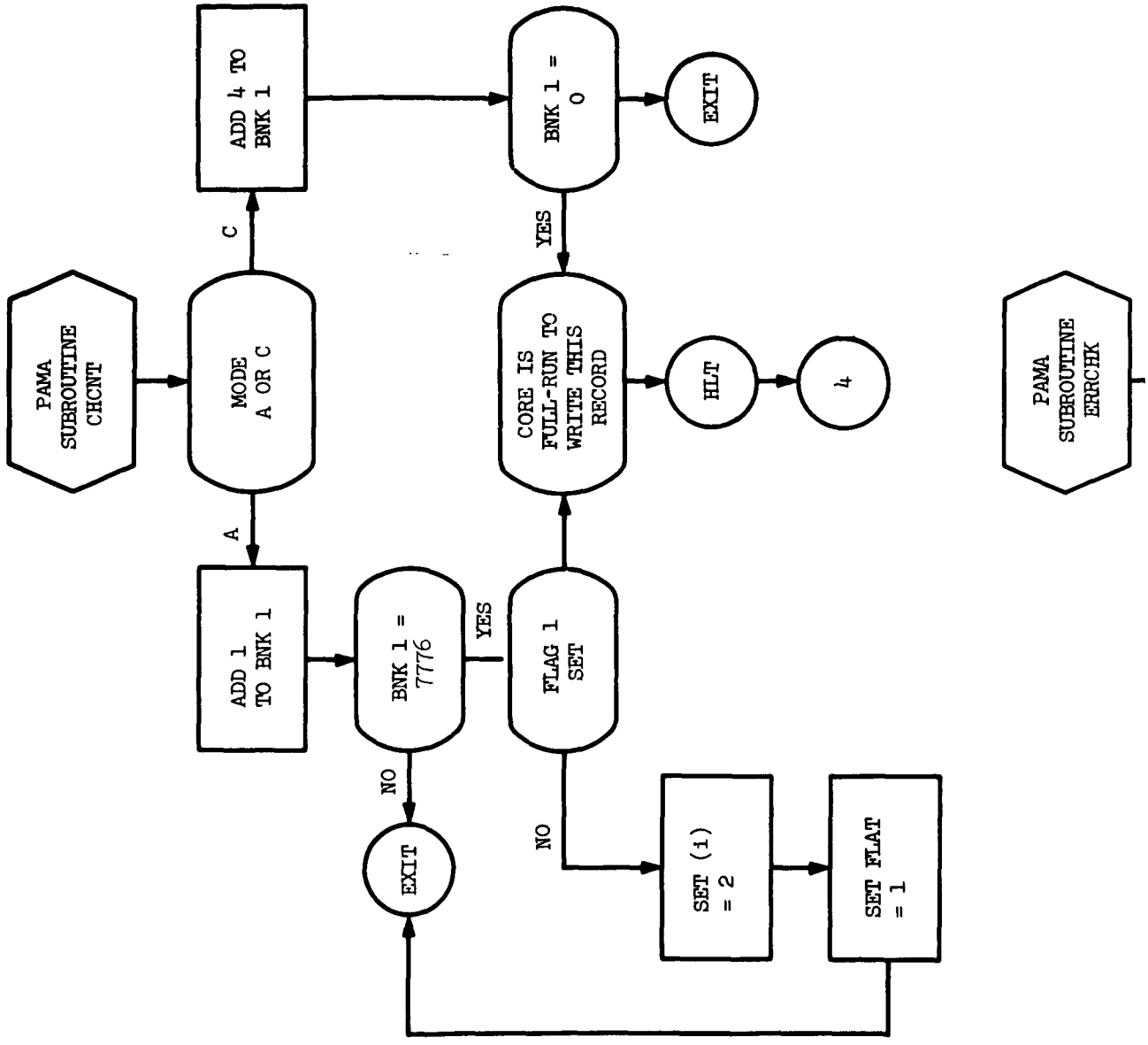

PACKEM SUBROUTINE
MODE = A OR C
C
A
NC
IS FLAG 1 SET
LOAD (1) BNK 1 & 3
LOGICAL PROD. LEVEL
STORE (1) BNK 1
ADD 4 to BNK 1
BNK 1 = 0
YES
EXIT
SET BLOK = 0
STORE 7776 IN CHECK
SET (1) = 1
SET BNK 1 = 0
SET TRSFR = 0
LOAD (1) TRSFR
LOGICAL PROD LEVEL
STORE C (BNK 1) IN CHECK
STORE C (BNK 1) IN SPEC.


LOAD (i)
TRSFR
LOGICAL
PROD
LEVEL
LEFT SHIFT
6
STORE (i)
BLOK
ADD 1
TO TRSFR
LOAD (i)
TO TRSFR
LOGICAL
PROD. LEVEL
ADD (i)
TO BLOK
ADD 1 TO
BNK 1 &
TRSFR
SUB
CHECK
NO
A = 0
NO
YES
FLAG 1
SET
YES
NO
STORE C
(CHECK) IN
BNK 1
SET (i)
= 1
EXIT
SET (i)
= 2
CLEAR
FLAG 1
STORE C
(SPEC) IN
CHECK

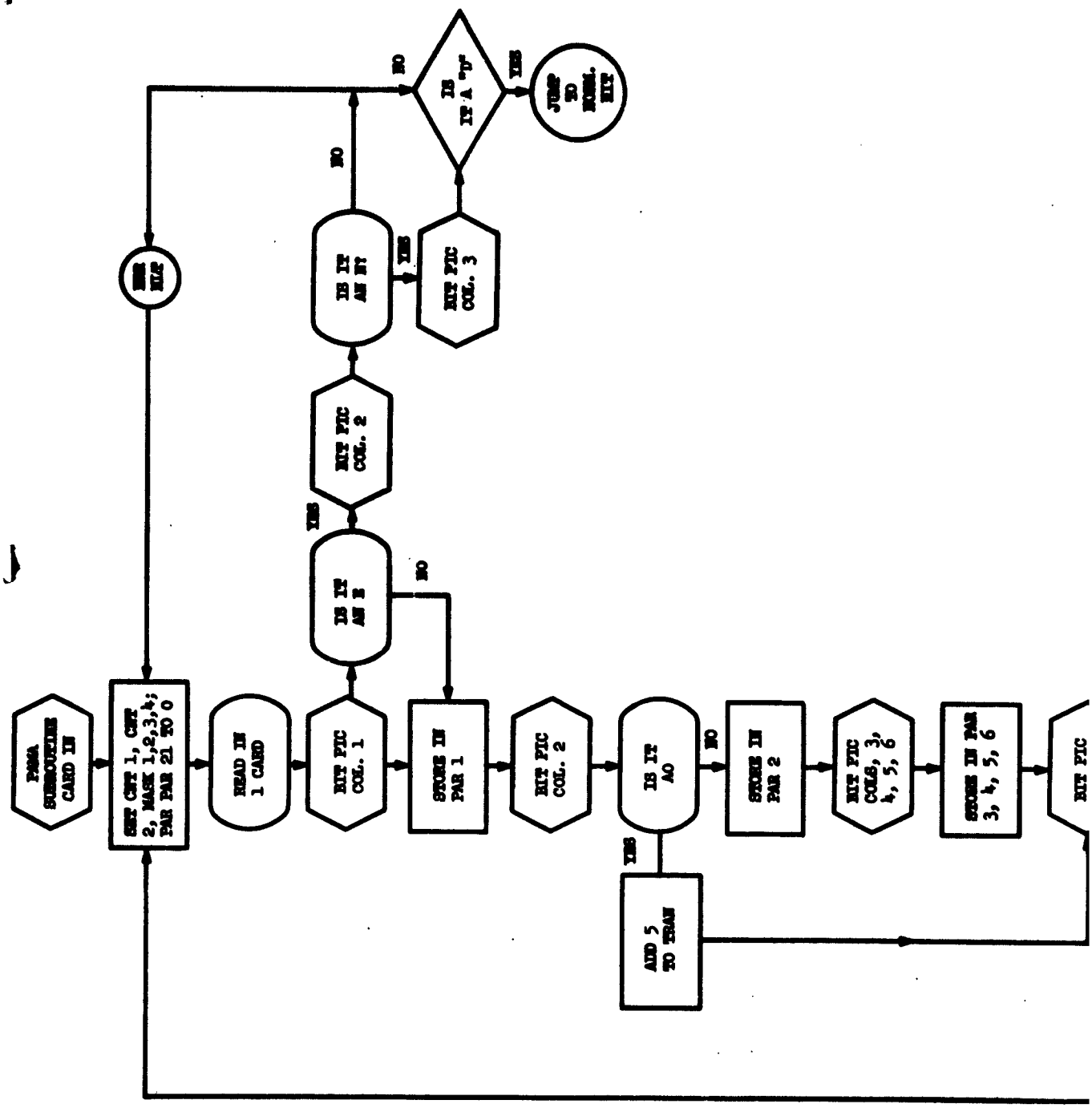

MAPA SUBROUTINE SKIPFI
SKIP = 0
YES
EXIT
SKIP 1 FILE
SUB 1 FROM SKIP
MAPA SUBROUTINE PUNCH A
READ 1 WORD FROM PFR
LEFT SHIFT 6
LOG PROD. LEVEL
PUNCH 1 FRAME
READ 1 WORD PFR
LOG PROD. LEVEL
MAPA SUBROUTINE PUNCH C
ADD 3 TO PFR
LOAD FROM PFR
LOG PROD. LEVEL
PUNCH 1 FRAME
ADD 4 TO PFR
PFR => PTO
YES
NO

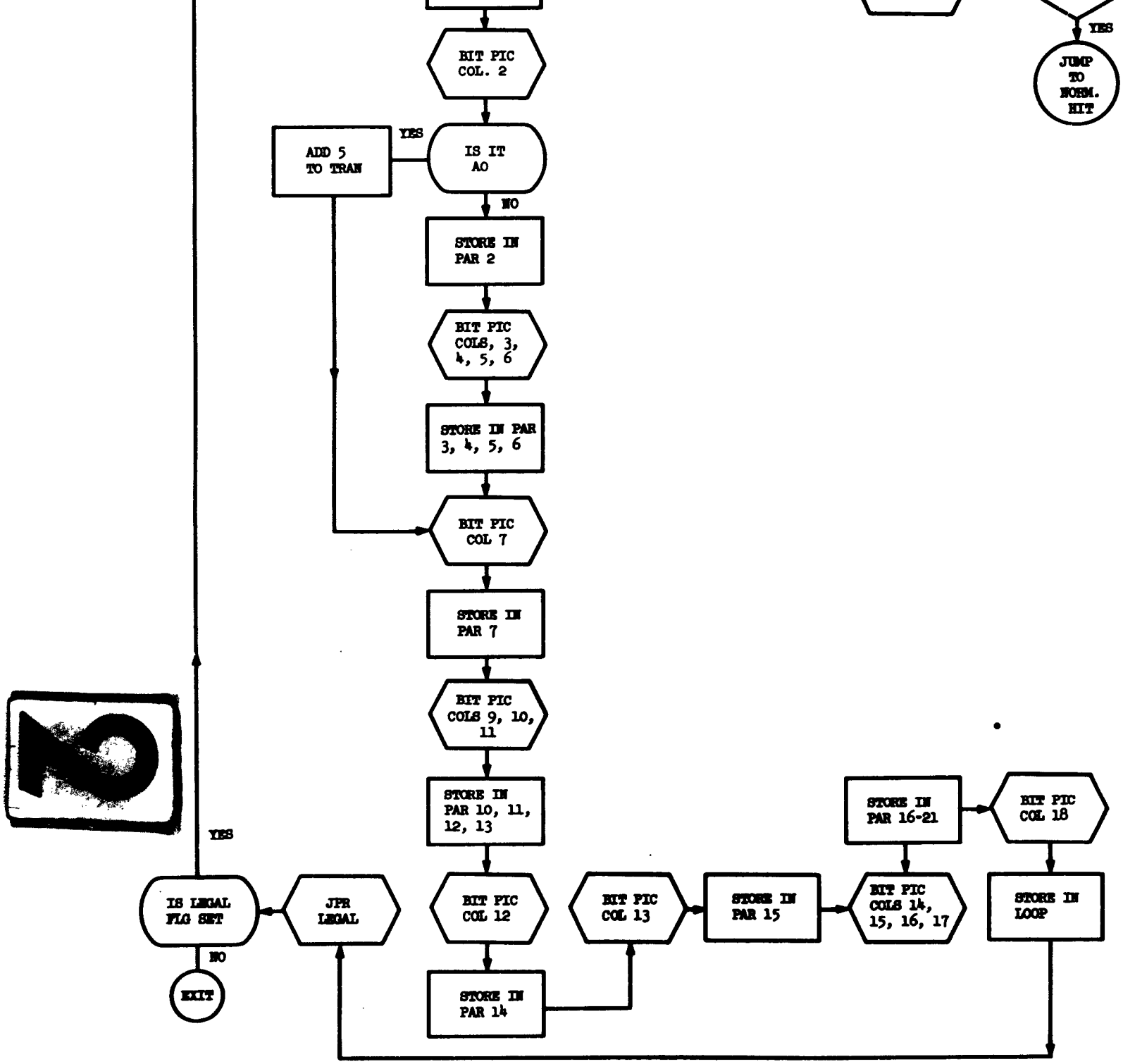
SKIP
1 FILE
SUB 1 FROM
SKIP
LEFT SHIFT
6
LOG PROD.
LEVEL
PUNCH 1
FRAME
READ 1
WORD PFR
LOG PROD.
LEVEL
PUNCH 1
FRAME
ADD 1 TO
PFR
PTO =
PFR
YES
EXIT
NO
LOAD FROM
PFR .
LOG PROD.
LEVEL
PUNCH 1
FRAME
ADD 4 TO
PFR
PFR =>
PTO
YES
EXIT
NO

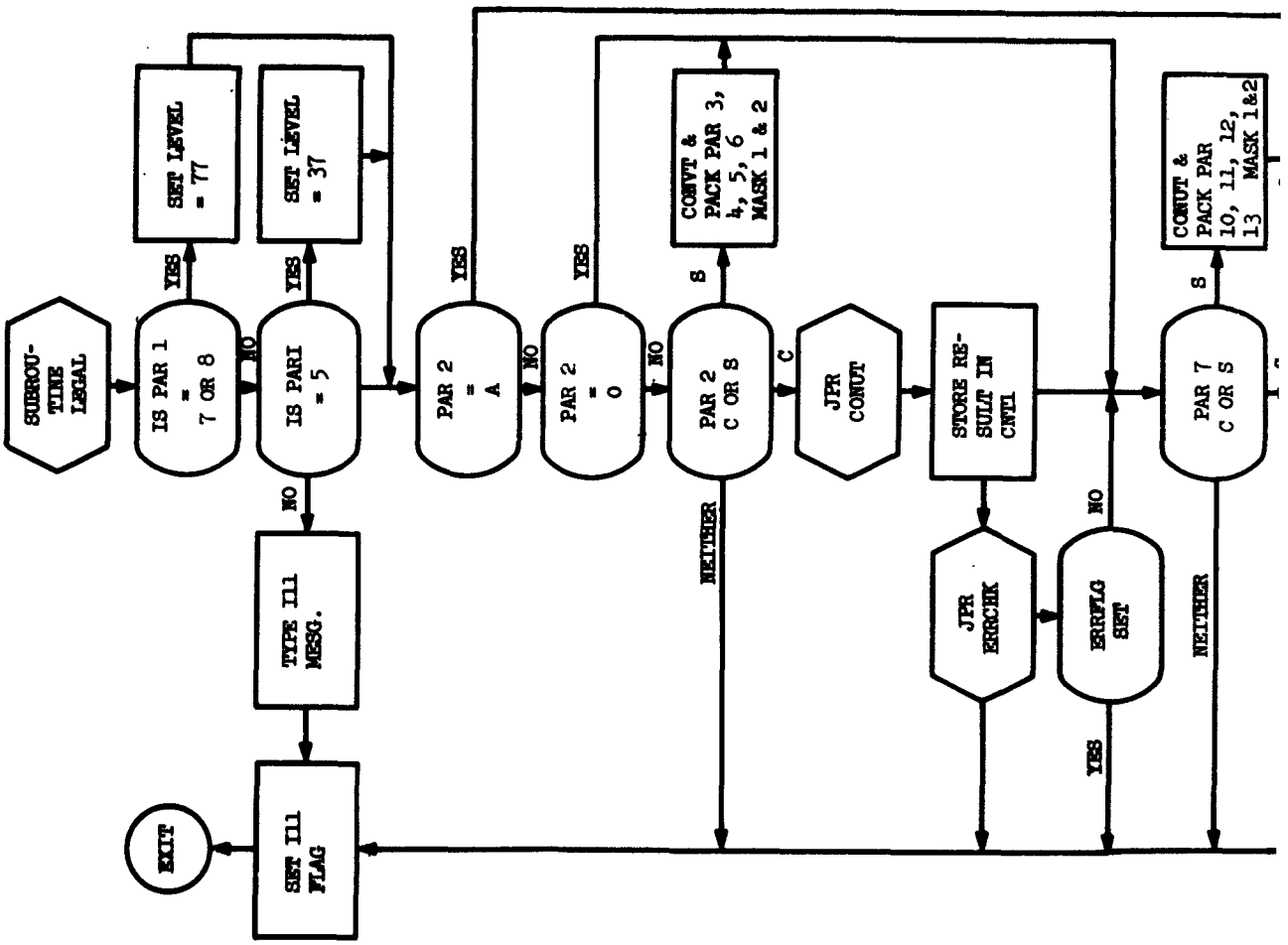
2

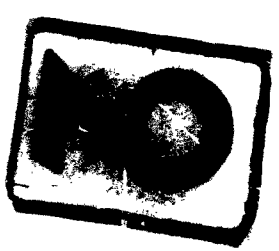

PAMA SUBROUTINE CHCNT
MODE A OR C
C
ADD 4 TO BNK 1
BNK 1 = 0
EXIT
YES
CORE IS FULL-RUN TO WRITE THIS RECORD
HLT
4
PAMA SUBROUTINE ERRCHK
A
ADD 1 TO BNK 1
BNK 1 = 7776
YES
FLAG 1 SET
NO
EXIT
NO
SET (1) = 2
SET FLAT = 1

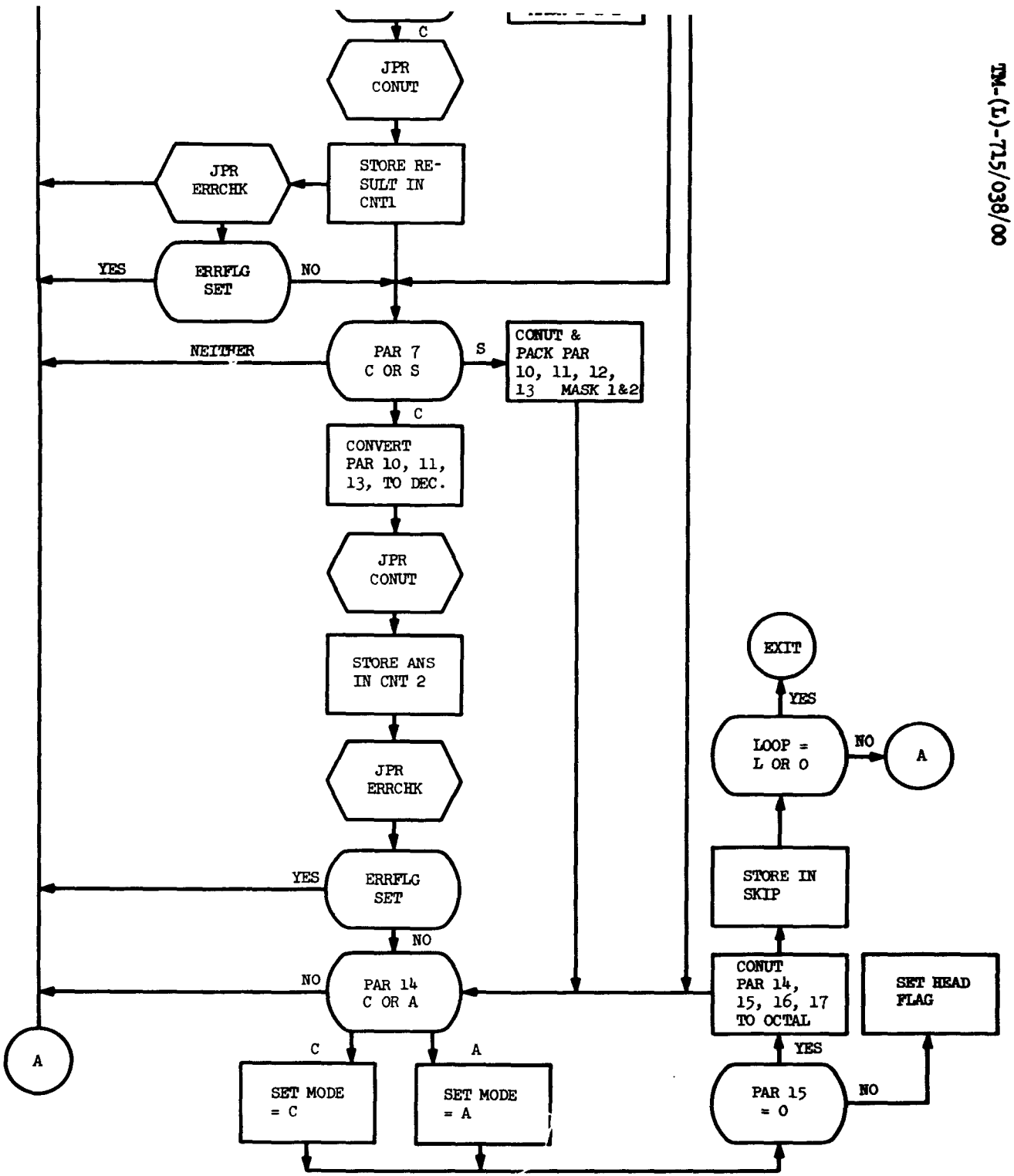
BNK 1
BNK 1 =
0
EXIT
YES
A OR C
CORE IS
FULL-RUN TO
WRITE THIS
RECORD
HLT
4
TO BNK 1
BNK 1 =
7776
YES
FLAG 1
SET
NO
EXIT
NO
SET (1)
= 2
SET FLAT
= 1
PAMA
SUBROUTINE
ERRCHK
IS COUNT
>777
NO
EXIT
SET ERRFLG


FORM SUBROUTINE CARD IN
SET OFF 1, OFF 2, MASK 1,2,3,4; PAR PAR 21 TO 0
READ IN 1 CARD
HIT PIC COL. 1
STORE IN PAR 1
HIT PIC COL. 2
IS IT A0
STORE IN PAR 2
HIT PIC COLS. 3, 4, 5, 6
STORE IN PAR 3, 4, 5, 6
ADD 5 TO TEAM
IS IT AN H
HIT PIC COL. 2
IS IT AN H
HIT PIC COL. 3
NO
YES


YES
JUMP TO NORM. HIT
BIT PIC COL. 2
YES
ADD 5 TO TRAN
IS IT AO
NO
STORE IN PAR 2
BIT PIC COLS, 3, 4, 5, 6
STORE IN PAR 3, 4, 5, 6
BIT PIC COL 7
STORE IN PAR 7
BIT PIC COLS 9, 10, 11
STORE IN PAR 10, 11, 12, 13
STORE IN PAR 16-21
BIT PIC COL 18
YES
IS LEGAL FLG SET
JPR LEGAL
BIT PIC COL 12
BIT PIC COL 13
STORE IN PAR 15
BIT PIC COLS 14, 15, 16, 17
STORE IN LOOP
NO
EXIT
STORE IN PAR 14


SUBROU-TINE LEGAL
IS PAR 1 = 7 OR 8
YES
SET LEVEL = 77
NO
IS PARI = 5
YES
SET LEVEL = 37
NO
TYPE ILL MESG.
SET ILL FLAG
EXIT
PAR 2 = A
YES
PAR 2 = 0
YES
PAR 2 C OR S
S
CONVT & PACK PAR 3, 4, 5, 6 MASK 1 & 2
C
JPR CONUT
STORE RE-SULT IN CNTL
JPR ERRCHK
NO
ERRFLG SET
YES
NEITHER
NEITHER
PAR 7 C OR S
S
CONUT & PACK PAR 10, 11, 12, 13 MASK 1&2
NO




C
JPR CONUT
STORE RESULT IN CNT1
JPR ERRCHK
YES
ERRFLG SET
NO
NEITHER
PAR 7 C OR S
S
CONUT & PACK PAR 10, 11, 12, 13 MASK 1&2
C
CONVERT PAR 10, 11, 13, TO DEC.
JPR CONUT
STORE ANS IN CNT 2
JPR ERRCHK
YES
ERRFLG SET
NO
NO
PAR 14 C OR A
A
C
SET MODE = C
A
SET MODE = A
EXIT
YES
LOOP = L OR 0
NO
A
STORE IN SKIP
CONUT PAR 14, 15, 16, 17 TO OCTAL
SET HEAD FLAG
YES
PAR 15 = 0
NO

18 February 1963

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THOMPSON, J. W.	22077	WILSON, G. D.	22101
THORNTON, R. L.	14050	WINSOR, M. E.	24137
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WARSHAWSKY, S. B.	22082	ZUBRIS, C. J.	24075

UNCLASSIFIED

System Development Corporation,
Santa Monica, California
160-A UTILITY PROGRAM DESCRIPTIONS
MILESTONE XI SEMPAP.
Scientific rept., TM(L)-715/038/00,
by E. J. Rosenberg. 18 January 1963, 18p.
(Contract AF 19(628)-1648, Space Systems
Division Program, for Space Systems Division,
AFSC)

Unclassified report

DESCRIPTORS: Programming (Computers).
Satellite Networks.

Describes SEMPAP, a 160-A program which
provides an off-line capability of UNCLASSIFIED

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generating magnetic tape from paper tape UNCLASSIFIED
for input to 1604 programs, and
generating paper tape output from magnetic
tape produced by 1604 programs.
States that the function of this program
is to relieve the 1604 of time consuming
paper tape reading and punching. UNCLASSIFIED